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PRESENTATION OF CHINA'S LAUNCH SERVICES

THE DELEGATION
OF CHINA GREAT WALL INDUSTRY CORPORATION

OCT. 21, 1986

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PRESENTATION OF CHINA'S LAUNCH SERVICES

Since the launch of its first satellite in April 1970, China has successfully launched 19 satellites and established an independent space engineering system, which consists of Long March series launch vehicles, two satellite launch sites, a complete TT&C network including its tracking vessels, and, moreover, a contingent of experienced research, design, manufacture and experiment technical force. All these launch facilities can be used to provide commercial satellite launch services for foreign clients.

CAPABILITY * POLICY * ORGANIZATION

1. With our limited manufacture and launch capability, we can implement 10-12 launches per year from two launch sites. Apart from the needs of domestic clients, we have certain amount of launch opportunities to be offered to foreign clients. Under the current situation that the launch capacity available can not meet the requirements of satellites to be launched, it is our understanding that our provision of launch services to foreign clients is only a supplement to the world launch service market as well as one way of international friendly cooperation. We are also willing to explore and discuss the possibility with American or European companies, if they wish, to jointly market the launch services.

2. Provision of launch services is quite distinct from technological transfer of satellite or rocket both in nature and concept. The transportation of foreign satellites into China

for launch is a matter of transit other than that of export and import or a transfer to China of the client's satellite . In the launch of its satellite, such data as weight, profile dimension, mechanical and electrical interface provided by the client would never get into the technical patents and secret of the satellite. After the entry of satellite into China until its launch at China's launch site, we would like to deal with various affairs concerned in the concept of a transit item, assisting the client in simplifying the entry formalities including customs exemption of examination of the satellite and providing necessary security measures for the satellite. We also hope American government agencies concerned can treat this matter in the principle of transit item other than a transaction of import and export, simplifying approval formalities and making things convenient.

3. We are now discussing commercial launch services with many firms in various countries. We have signed launch reservation agreements with Swedish Space Corporation, The Western Union Telegraph Company and Teresat Corporation of States. The necessary discussions and technical coordinations are being conducted in accordance with the agreed schedule and sequences.

4. China Great Wall Industry Corporation is a properly registered Chinese organization to market the launch services with a legal person status. CGWIC is responsible for the launch services marketing, commercial negotiation, contract execution and performance. Beijing Wan Yuan Industry Corporation is responsible for the development manufacture and test of Long March rockets. China Satellite Launch Telemetry and Control General is responsible for the launch operation and launch support services.

5. The launch service price is composed of the cost plus a reasonable profit. The payment terms, payment schedule, launch postponement fee and other matters related shall be discussed and stipulated in the contract by both parties.

CARRIER ROCKET

1. Long March Launch Vehicle Series

Long March-2 (CZ-2 in Chinese, LM-2 in English) and Long March-3 (CZ-3 in Chinese, LM-3 in English) are two members of the Long March family available to provide launch services.

*9 families only 1st. was Saturn
Add 3rd stage → LM-2
so tech is mature.
vs 1st stage + satellite, it will launch.*

The payload capability of Long March-2 is delivery of a payload of 2500kg to low earth orbit (LEO) (round 200km).

The payload capability of Long March-3 is delivery of payload of 1400kg to Geosynchronous Transfer Orbit (GTO).

Long March-2-4L (LM2-4L) is expected to be available around 1990 with a capability of 9000kg to LEO (round 200 km). *add 4 liquid boosters → LM-2*

Long March-2 is a two stage liquid propellant expendable launch vehicle. Long March-3 is built on the proven technology of LM-2 with an additional third stage liquid hydrogen-liquid oxygen rocket. Long March-2-4L is a improved version of Long March-2 with four strap-on liquid boosters, most of its hardware and technology have undergone the flying tests.

2. Interface Between Long March Family Rockets and Satellites

in part only dealt in satellite → rocket. But -

During the Long March system design, we took a full consideration of the interface compatibility between launch vehicles and satellites. Therefore, the satellites which are compatible with ARIANE or STS can also be launched on Long March launch vehicles without modifications. But it is necessary to carry out the analysis of compatibility. *have discussed this in*

Hughes & W Union. This is only discussion we have had in them.

3. Quality Control and Management

"Quality first" is an important principle in China's rocket design and manufacture. One of the principal aspects in the rocket system design is the reliability design. An independent quality control organization closely supervise the quality management in the manufacturing process and strictly examine the quality from the raw materials and component to be used. The manufacture department with the assistance of designers, exactly following the technical specifications, manufactures and tests each part, instrument and subsystem of the rocket. The strict quality control enables Long March rockets to achieve a high success launch rate.

Long March-1 had two flights and both are successful.

3 1/2% quality control
design
integr. all
aimed at -

Long March-2 have had nine launches, eight of which are max reliability successful except for the failure of the first flight. - problems identified by engineers after

Long March-3 have launched for three times. In its first flight, 20 sec after launch except for the break down of the third stage following the re-start, each subsystem of the rocket was working normally and the satellite was properly separated according to the pre-set sequence. 90% of experiment items listed in the flight experiment outline had been performed. Nevertheless, the first flight of Long March-3 achieved significant technical result.

one of wires for gyros broke so rocket out of control 9th day was 10/8/86

Our engineers, based on the telemetry data obtained from the first flight, made an extensive investigation and analysis to find out the cause of trouble. Afterwards, they made necessary modifications to the third stage and performed four static test and eight ignitions in order to varify the correctness of the trouble-shooting and modification measures. All these had been completed within two months. It was only 70 days from the first launch that the second flight of Long March-3 took

place and achieved a complete success. The third flight of Long March-3 was also a success.

4. Review

In the performance of a launch mission for foreign satellite, in order to ensure the correctness of coordination between the launch vehicle and satellite, each work in different faces has to be reviewed, including interface control file review, mission analysis review, safety submission review, operation sequences review, and launch preparation review, etc. We will keep the client informed about the preparation progress of the launch vehicle in accordance with agreed schedule and form. The client has the right to make the decision of launch or no-launch in line with the terms and conditions stipulated in the contract. *These procedures to be discussed both sides.*

Also many other more detailed areas, eg. it will have to test launcher after arrival at site.

Have already begun such work with W. Union.

zhongguo shupian

LAUNCH OPERATION SERVICES

1. Composition

China's launch technology has been developed into a comprehensive system including launch complexes and TT&C network which are adapted to the launch vehicles. Following organizations under the leadership of China Satellite Launch and TT&C General (CLTC) are engaged in commercial satellite launch services:

- Jiuquan Satellite Launch Center (for 1 41 mission);
- Xichang Satellite Launch Center (for 1 28.5 mission);
- Xian Satellite Control Center and the fixed & mobile TT&C stations in its network scattered in Shanxi, Fujian, Jilin, Guangxi and Xinjiang Provinces as well as ocean tracking ships;
- China Luoyang Institute of Tracking Telecommunication technology;
- Beijing Special Engineering Design & Research Institute.

The whole system has a total employees of 20,000, 5,000 of which are engineers and senior engineers. It primarily performs tasks of ground testing, launching, meteorological forecast, special fuel supply, chemical analysis and transportation.

(1) Jiuquan Satellite Launch Center (JSLC) is located in Jiuquan area of China's northwest Gansu Province. With vast plain area the dedicated airport, railway and highway make the transportation very convenient.

There are two launch pads and two launcher and satellite preparation buildings in the launch area which installed with testing, hoisting, transportation, power and gas supply, fuel filling and launch facilities. It is also equipped with optical theo-

JSLC has successfully delivered 16 scientific exploration and technical experiment satellites to low earth orbit, eight of which have been recovered to the ground under the control of pre-set sequences.

2. Xichang Satellite Launch Centre (XSLC) is situated at Xichang area of China's southwest Sichuan Province with its headquarter at Xichang city. XSLC is comprised of technical centre, launch complexes, command & control centre, TT&C stations, communication system, meteorology services and technical logistics.

The principal role of XSLC is to perform the experimental and operational launch missions of broadcasting satellite, communication satellite and meteorological satellite with Long March-3 as launch vehicles. It has successfully launched three communication satellites.

Xichang airport, 50 km away from the launch centre, can be used for jumbo aircrafts to land and take off. From Xichang airport there are a railway and a highway directly going to the technical centre and launch site. A cement road 8 metres wide runs from technical centre to the launch site.

3. Xian Satellite Control Centre (XSCC) is composed of a TT&C real-time operation centre, post-launch data processing centre, ocean-going tracking ships and scattered fixed and truck-carried TT&C stations, which form a TT&C network to support the launch of LEO or GTO satellites with different

altitude and inclinations. Equipped with ultra shortwave TT&C system, C-band radar system, C-band unified TT&C system, TT&C system for different bands, each station relayed to INTELSAT and computer control system, XSLC is able to support launch services and connect with international network to provide launch support and satellite operation services for foreign clients.

4. China Luoyang Institute of Tracking, Telecommunication Technology (LITTT) is specialized in the research and development of technology for satellite tracking, control and communication. And its major task is to design well-equipped laboratory and simulation facilities. LITTT is the chief technical designer of JSLC, XSLC and XSCC.

5. Beijing Special Engineering Design & Research Institute (BSEDRI) undertakes the launch site selection and exploration, overall planning, engineering design of industry and civil architecture and large ground facilities. It is the primary engineering designer of JSLC, XSLC and XSCC.

II. Launch Procedures

- Satellite is expected to be sent to Xichang by air or domestic railway 40-60 days before launch;
- Satellite is transported through a high way or railway to the corresponding preparation and checkout building at the technical centre.
- Launch vehicle is sent to the assembly building (BL1), the associated instruments are sent to unit device testing building (BL2);

- Satellite is shipped to the payload preparation building (BS1 or BS2);
- Apogee kick motor is transported to its checkout and preparation building (BM);
- Pyrotechnics used in rocket and satellites are stored in BP1 or placed in the pyrotechnics test workshop (BP2);
- Satellite and launch vehicle are prepared respectively in separate buildings at technical center;
- The prepared satellite and apogee kick motor will be transported into satellite assembly and filling building (BS3) for the final preparation;
- After the completion of all work at technical center satellite will be sent to the launch site by highway in a special payload container;
- On the launch site, the launch vehicle and satellite will be erected, mated and tested. An integration operation and launch operation rehearsal will be performed;
- After the completion of the final preparation on the launch site, launch operation enters into a 16-hour countdown sequence.

mx. li - PICC.

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THE PEOPLE'S INSURANCE COMPANY OF CHINA

Head Office: BEIJING

Established in 1949

PICC started to underwrite launch ins. according to their requirements

(China Great Wall Industrial Company started to purchase slats in 10/8 launch insurance from PICC for civil satellites for domestic use in Oct. 1985) Up to now, two low orbit satellites for general survey of land have been launched on Long March 2, one in Oct. 1985 and the other in Oct. 1986. In Feb. 1986, a Communication and Broadcast satellite of geostationary orbit was launched on Long March 3. The above three satellites were all insured in Ren Min Bi (Chinese Currency) and no reinsurance was placed. The insurance conditions such as scope of liability, period of insurance and claims handling etc, were decided upon through negotiation between PICC and ~~Great Wall~~ the client and in accordance with the concrete conditions of our country, not completely identical with the international practice. All the three launches have been complete successes.

Having good knowledge about the safety and reliability of the Long March Series Launch Vehicles and the telemetry and control system which completely meets with our underwriting requirements. PICC is pleased to provide launch insurance for satellite launchings to be conducted by Great Wall commencing from ignition until separation of satellite from launch vehicle. Insurance may be effected in foreign currency so that claims, if any, be paid in foreign currency. The sum insured is decided upon through negotiation and based on the value of the satellite, launching cost and other agreed expenses. For this kind insurance using foreign currency, PICC will seek support

*"International
guidelines"*

from the international reinsurance markets although PICC will be willing to have a big retention which is important for receiving reinsurance support and quoting favourable conditions and rates to our clients. With regard to the risks after satellite's separation from launch vehicle, PICC can't act as a direct underwriter for reasons known to all. Therefore the client should, with the assistance of Great Wall, apply for insurance elsewhere. Nevertheless, this does not preclude the possibility of PICC taking a participation by way of reinsurance, if the conditions are considered suitable.

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It is understood that China has joined space treaty. It goes without saying that China has the obligation to abide by the treaty. China will be responsible for her peaceful activities in the outer space and will pay for the damage and/or loss, if any, resulting therefrom.

PICC willing to provide sub insurance for clients, if necessary.